

\* NOTICES \*

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CLAIMS

[Claim(s)]

[Claim 1] Enzyme processing natural rubber latex which extracts the protein immersed and disassembled into dilute-alkali underwater, such as water, warm water, or aqueous ammonia, after the surfactant was added, and the neutralizer was added to natural rubber latex, adjusted pH, flooding with protease liquid, making the latex which disassembled protein, blending a vulcanizing agent with the latex which disassembled the above-mentioned protein and performing fabrication and vulcanization, and is characterized by drying.

[Claim 2] Enzyme processing natural rubber latex according to claim 1 whose rate of addition of a surfactant is 0.01 - 5.0% of the weight of within the limits.

[Claim 3] Enzyme processing natural rubber latex according to claim 1 whose concentration of protease liquid is 0.01 - 2.0% of the weight of within the limits to natural rubber latex.

[Claim 4] Enzyme processing natural rubber latex according to claim 1 whose temperature of protease liquid is within the limits of 30-60 degrees C.

[Claim 5] Enzyme processing natural rubber latex according to claim 1 whose time to flood with protease liquid is within the limits of 10 minutes - 48 hours.

[Claim 6] Enzyme processing natural rubber latex according to claim 1 whose time to extract the protein immersed and disassembled is within the limits of 10 minutes - 48 hours.

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[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] The invention in this application relates to disassembly of the protein contained in natural rubber, and the removal method of the protein.

[0002]

[Description of the Prior Art] In the case of solid rubber, after combination, vulcanization, and fabrication, the product which used natural rubber as the raw material conventionally was washing by rinsing or boiling in order to remove an impurity. Moreover, in the case of the product which used natural rubber latex as the raw material, leaching after combination, fabrication, and vulcanization (extraction with warm water etc.) was performed, and the impurity has been removed in it.

[0003]

[Problem(s) to be Solved by the Invention] However, it was reported that the protein contained in natural rubber triggers a reaction as allergen to the man of a certain specific allergy body in recent years, and development of the method for obtaining the still higher rate of \*\* protein from a fixed limitation being in proteinic removal was desired by the method of the above-mentioned conventional \*\* protein.

[0004] As a thing in response to it, JP,6-56905.A or the \*\* protein method given in JP,6-256404.A is introduced. However, these methods were what has technical problems, such as each blending an enzyme etc. to natural rubber latex, and a facility and time requiring that centrifugal separation removes an impurity further etc., and pulling up raw material cost sharply.

[0005] The invention in this application was made in view of such the present condition, and aims at offering the completely different method of disassembling the protein in natural rubber and removing exactly and economically, by very brief composition, from the above-mentioned conventional method.

[0006]

[Means for Solving the Problem] The above-mentioned purpose is attained by the manufacture method of the deproteinized natural rubber indicated by the aforementioned patent claim. Namely, (1) Enzyme processing natural rubber latex which extracts the protein immersed and disassembled into dilute-alkali underwater, such as water, warm water, or aqueous ammonia, after the surfactant was added, and the neutralizer was added to natural rubber latex, adjusted pH, flooding with protease liquid, making the latex which disassembled protein, blending a vulcanizing agent with the latex which disassembled the above-mentioned protein and performing fabrication and vulcanization, and is dried.

[0007] (2) (1) whose rate of addition of a surfactant is 0.01 - 5.0% of the weight of within the limits Enzyme processing natural rubber latex of a publication.

(3) (1) whose concentration of protease liquid is 0.01 - 2.0% of the weight of within the limits to natural rubber latex Enzyme processing natural rubber latex of a publication.

[0008] (4) (1) whose temperature of protease liquid is within the limits of 30-60 degrees C Enzyme processing natural rubber latex of a publication.

(5) (1) whose time to flood with protease liquid is within the limits of 10 minutes - 48 hours Enzyme processing natural rubber latex of a publication.

[0009] (6) (1) whose time to extract the protein immersed and disassembled is within the limits of 10 minutes - 48 hours It is enzyme processing natural rubber latex of a publication.

The forms of operation including an operation of the invention in this application are explained below.

[0010]

[Embodiments of the Invention] Generally natural rubber latex is supplied as a liquid of about 60% of solid contents. To this natural rubber latex, it is added medicines, such as a vulcanizing agent, suitably and processed [ fabricate, vulcanize and ], and goes by the general processing method.

[0011] However, to this natural rubber latex, addition is first performed for a surfactant to a latex 0.01 to 5.0%, and next, with a neutralizer (acid matter), pH is lowered and it goes by this invention.

[0012] In the case of the high ammonia natural rubber latex generally used, it is necessary to set the pH to 7-10. The pH value at this time is determined by the kind of protease added in the following stage.

[0013] Decomposition is promoted stirring protease loosely in 10 minutes - 48 hours by 30-60 degrees C generally to natural rubber latex at the temperature which performed addition 0.01 to 2.0% and suited the kind of the enzyme next. Suppose that this

raw material is called enzyme processing natural rubber latex.

[0014] To this enzyme processing natural rubber latex, a vulcanizing agent is blended like usual and processing of fabrication and vulcanization is given. After this, the protein which threw in the product made in dilute-alkali water, such as water, warm water, or aqueous ammonia, etc., was immersed for 10 minutes to 48 hours, and was disassembled out of natural rubber is extracted, and it dries and considers as a product.

[0015] The surfactant used is good at a common surfactant, and good by the anion system, the Nonion system, etc. As an example, by the anion system, there are fatty-acid soap, alkyl sulfate, alkyl ether sulfate and dioctyl sulfosuccinate salts, a dodecylbenzenesulfonic acid system, etc., and ester types, such as a polyoxyethylene lauryl ether type, alkylphenol types, such as the polyoxyethylene nonylphenyl ether, and polyoxyethylene monochrome laurate, etc. can be used as a Nonion system.

[0016] moreover -- although decided by the kind of bacillus used as the raw material as protease used -- as an example -- *Bacillus coagulans*, *Bacillus licheniformis*, *Bacillus subtilis*, *Bacillus lentus*, *Aspergillus niger*, *Aspergillus melleus*, *Aspergillus oryzae*, and *Mucor pusillus* etc. -- from -- it is extracted

[0017] Moreover, as a neutralizer which adjusts pH, phosphate, an organic acid, an inorganic acid, etc. can be used as matter of weak-acid nature.

[0018]

[Example 1] To the high ammonia natural-rubber-latex 100 section, the 1 section adds and a sodium lauryl sulfate is stirred well. Next, it adds measuring pH, and 5% sodium phosphate is performed until it is set to pH 9.5.

[0019] Next, it is protease (*Bacillus licheniformis* extract). The 0.5 sections are supplied, and it is left for 24 hours, carrying out the temperature up of the solution temperature to 50 degrees C, and stirring it loosely. The vulcanizing agent usual by next is blended and fabrication, vulcanization, etc. are processed. It is under 50 degrees C and 0.5% aqueous ammonia after product mold release for 12 hours, and dries by extracting the disassembled protein. The content nitrogen concentration at this time is 0.015%.

[0020]

[Example 2] About the protease used in the example 1, it is *Bacillus lentus*. Changing into the protease of an extract, others perform the same process and perform extraction and dryness. The content nitrogen concentration at this time was 0.013%.

[0021]

[Comparative Example(s)] Fabrication, vulcanization, etc. were processed at the usual process using the same high ammonia natural rubber as having used it in the example 1, without putting in protease, and it was under 50 degrees C and 0.5% aqueous ammonia about extraction of a product for 12 hours, and dried by extracting protein.

[0022] The content nitrogen concentration at this time was 0.12%. A proteinic content shall be measured by content nitrogen concentration. Measurement of content nitrogen concentration was performed by the Kjeldahl method.

[0023]

[Effect of the Invention] According to the invention in this application, the effect taken with having explained in the above-mentioned example below is done so.

\*\* since processing can do everything but performing enzyme processing before combination of usual natural rubber latex like the general processing method, and also operation is brief -- a special process -- not needing -- realistic -- in addition -- and it becomes possible to remove efficiently

[0024] \*\* If it is a combination facility of general natural rubber latex, don't need extension of a special facility only by using it as it is.

\*\* Don't spoil the merit of processability which is the greatest feature of natural rubber latex.

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